

Appl. No. 09/943,750
Amdt. Dated May 12, 2004
Reply to Office Action of December 12, 2003

AMENDMENTS TO THE CLAIMS

1. (Withdrawn) A tire anti-puncture device comprising:

a puncture-resistant layer comprising at least two layers of woven fabric material, each layer having a taped fiber density of at least about 80% of full in at least one of the warp and fill and comprising fibers having a tenacity of less than about 15 g/denier, wherein the puncture-resistant layer is shaped and configured to form a belt within and around the periphery of a tire.

2. (Withdrawn) The tire anti-puncture device of claim 1, wherein each of said layers of fabric has a bulk density, excluding any coatings applied to the fabric layers, that is at least about 20% of the density of any polymeric material forming the fibers of the fabric material.

3. (Withdrawn) The tire anti-puncture device of claim 1, further comprising at least one covering layer having an abrasion limit of less than about 2000 cycles as measured by a Tabor test utilizing a CS10 wheel with 1000 gram load, wherein the test is run to tensile failure, defined as the point where the tensile strength of the covering layer is reduced by about 25%.

4. (Withdrawn) The tire anti-puncture device of claim 1, wherein the puncture-resistant layer has a puncture resistance of greater than about 2.0 lbs. force, wherein the puncture resistance is defined as the level force required to force a 0.05 in. diameter polished steel commercial hand sewing needle through the puncture-resistant layer, when clamped and supported in a 1 in. diameter ring, such that the point of the needle projects from the side of the fabric opposite that to which the force is applied by a distance of about 0.045 inch.

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5. (Withdrawn) The tire anti-puncture device of claim 1, wherein the at least two layers of fabric material are physically stacked upon each other without being bonded to each other.

6. (Withdrawn) The tire anti-puncture device of claim 1, wherein the at least two layers of fabric material are bonded to each other.

7. (Withdrawn) The tire anti-puncture device of claim 6, wherein the at least two layers are bonded together by an intermediate bonding layer.

8. (Withdrawn) The tire anti-puncture device of claim 7, wherein the intermediate bonding layer comprises materials that do not soften significantly at temperatures up to and including about 150°F.

9. (Canceled)

10. (Canceled)

11. (Canceled)

12. (Withdrawn) The tire anti-puncture device of claim 1, wherein the device comprises a separable strip shaped and configured to be removably insertable within a tire.

13. (Withdrawn) The tire anti-puncture device of claim 1, wherein the device comprises a strip bonded to an inner surface of a tire.

14. (Withdrawn) The tire anti-puncture device of claim 1, wherein the device is located within the cross-section of a tire body.

15. (Canceled)

16. (Canceled)

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17. (Withdrawn) The tire anti-puncture device of claim 1, wherein each layer of fabric material comprises fibers having a tenacity of less than about 8 g/denier.

18. (Canceled)

19. (Withdrawn) The tire anti-puncture device of claim 1, wherein each layer of fabric material comprises polyamide fibers.

20. (Withdrawn) The tire anti-puncture device of claim 1, wherein each layer of fabric material comprises polyester fibers.

21. (Withdrawn) The tire anti-puncture device of claim 1, wherein each layer has a taped fiber density of at least about 85% of full in at least one of the wrap and fill.

22. (Canceled)

23. (Withdrawn) The tire anti-puncture device of claim 1, wherein yarns comprising the woven fabric material have a weight per unit length of between 20 denier and about 100 denier.

24. (Withdrawn) The tire anti-puncture device of claim 1, wherein the layers of fabric material have been densified by calendering or shrinking the layers.

25. (Withdrawn) The tire anti-puncture device of claim 1, wherein yarns comprising the woven fabric material are untwisted.

26. (Withdrawn) A tire comprising the tire anti puncture device of claim 1.

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27. (Currently Amended) A tire anti-puncture device comprising:

a puncture-resistant layer comprising a woven fabric having a round packed cover factor of at least about 40% of full in the warp and at least about 65% of full in the fill, the fabric comprising fibers having a tenacity of less than about 15 g/denier, wherein the puncture-resistant layer is shaped and configured to form a belt within and around the periphery of a tire, and further comprising a coating applied to the woven fabric, the coating comprising a polymeric material that penetrates into and occupies at least a portion of the void space between fibers forming the fabric and upon hardening has a bulk modulus not exceeding about 10,000 psi.

28. (Currently Amended) The tire anti-puncture device of claim 27, wherein the woven fabric has a bulk density, ~~excluding any~~ including any said coatings applied to the fabric, ~~that is at least about~~ greater than 20% of the density of any polymeric material forming the fibers of the fabric material.

29. (Original) The tire anti-puncture device of claim 27, further comprising at least one covering layer having an abrasion limit of less than about 2000 cycles as measured by a Tabor test utilizing a CS10 wheel with 1000 gram load, wherein the test is run to tensile failure, defined as the point where the tensile strength of the covering layer is reduced by about 25%.

30. (Original) The tire anti-puncture device of claim 27, wherein the puncture-resistant layer has a puncture resistance of greater than about 2.0 lbs. force, wherein the puncture resistance is defined as the level force required to force a 0.05 in. diameter polished steel commercial hand sewing needle through the puncture-resistant layer, when clamped and supported in a 1 in. diameter ring, such that the point of the needle projects from the side of the fabric opposite that to which the force is applied by a distance of about 0.045 inch.

31. (Canceled)

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32. (Canceled)

33. (Currently Amended) The tire anti-puncture device of claim 27, further comprising [[a]] said coating applied as a liquid to the woven fabric, the applied coating, upon hardening, comprising a polymeric material having dispersed therein in abrasive particulate material.

34. (Canceled)

35. (Original) The tire anti-puncture device of claim 34, wherein the layer of fabric material has a round packed cover factor of at least about 50% of full in the warp.

36. (Original) The tire anti-puncture device of claim 35, wherein the layer of fabric material has a round packed cover factor of at least about 65% of full in the warp.

37. (Canceled)

38. (Canceled)

39. (Canceled)

40. (Original) The tire anti-puncture device of claim 27, wherein the puncture-resistant layer comprises at least two layers of fabric material.

41. (Original) The tire anti-puncture device of claim 40, wherein the at least two layers of fabric material are bonded together.

42. (Original) The tire anti-puncture device of claim 27, wherein the device comprises a separable strip shaped and configured to be removably insertable within a tire.

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43. (Original) The tire anti-puncture device of claim 27, wherein the device comprises a strip bonded to an inner surface of a tire.

44. (Original) The tire anti-puncture device of claim 27, wherein the device is located within the cross-section of a tire body.

45. (Canceled)

46. (Canceled)

47. (Original) The tire anti-puncture device of claim 27, wherein the woven fabric comprises fibers having a tenacity of less than about 8 g/denier.

48. (Original) The tire anti-puncture device of claim 47, wherein the woven fabric comprises fibers having a tenacity of between about 3 g/denier and about 8 g/denier.

49. (Original) The tire anti-puncture device of claim 27, wherein the woven fabric comprises polyamide fibers.

50. (Original) The tire anti-puncture device of claim 27, wherein the woven fabric comprises polyester fibers.

51. (Original) The tire anti-puncture device of claim 34, wherein yarns comprising the layer of woven fabric material have a weight per unit length of between 100 denier and about 500 denier.

52. (Original) A tire comprising the tire anti puncture device of claim 27.

53. (Withdrawn) A tire anti-puncture device comprising:

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a puncture-resistant layer comprising at least two layers of fabric, each of said layers of fabric comprising fibers having a tenacity of less than about 15 g/denier and each of said layers of fabric having a bulk density, excluding any coatings applied to said fabric layer, that is at least about 20% of the density of any polymeric material forming the fibers of the fabric layers, wherein the puncture-resistant layer is shaped and configured to form a belt within and around the periphery a tire.

54. - 133. (Canceled)

134. (New) A tire anti-puncture device according to claim 27, said puncture resistant layer comprising a continuous annular layer.